United States Patent [19]
Karmarkar

[11] Patent Number: 4,744,028
[45] Date of Patent: May 10, 1988

[54] **METHODS AND APPARATUS FOR EFFICIENT RESOURCE ALLOCATION**

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[21] Appl. No.: 725,342

[22] Filed: Apr. 19, 1985

[51] Int. Cl.[4] G06F 15/20; H04Q 3/66; H04M 7/00

[52] U.S. Cl. 364/402

[58] Field of Search 364/402; 379/113, 221; 340/524

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[57] ABSTRACT

A method and apparatus for optimizing resource allocations is disclosed which proceeds in the interior of the solution space polytope instead of on the surface (as does the simplex method), and instead of exterior to the polytope (as does the ellipsoid method). Each successive approximation of the solution point, and the polytope, are normalized such that the solution point is at the center of the normalized polytope. The objective function is then projected into the normalized space and the next step is taken in the interior of the polytope, in the direction of steepest-descent of the objective function gradient and of such a magnitude as to remain within the interior of the polytope. The process is repeated until the optimum solution is closely approximated. The optimization method is sufficiently fast to be useful in real time control systems requiring more or less continual allocation optimization in a changing environment, and in allocation systems heretofore too large for practical implementation by linear programming methods.

36 Claims, 5 Drawing Sheets